

Introduction to Microbiology Lab

Safety and security in laboratories

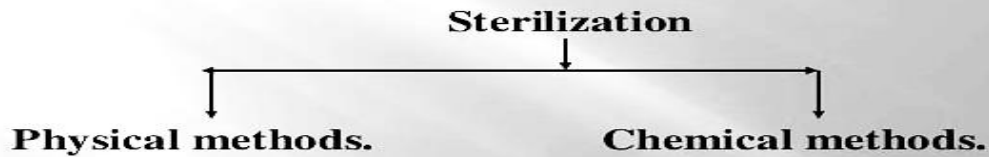
1. It is forbidden to bring drinks and food into the laboratory and to avoid touching the mouth and nose at work
2. Wearing unopened shoes when entering the laboratory.
3. Always wear the **lab coat** inside the laboratory.
4. Wearing Gloves and handling with great care the pathogenic microbes.
5. Wearing masks.
6. Clean the bench before work and disinfect it with a disinfectant
7. Wash hands with soap and water before starting and after work.
8. Cultivation of samples inside the Safety Cabinet.
9. Disposal of medical specimens implanted ,needles, pollination of loops and swabs intended for cultivation in the waste intended for them.
10. Make sure to write the information of the cultured sample on Petri dishes (on cap) and on tubes for liquid environments



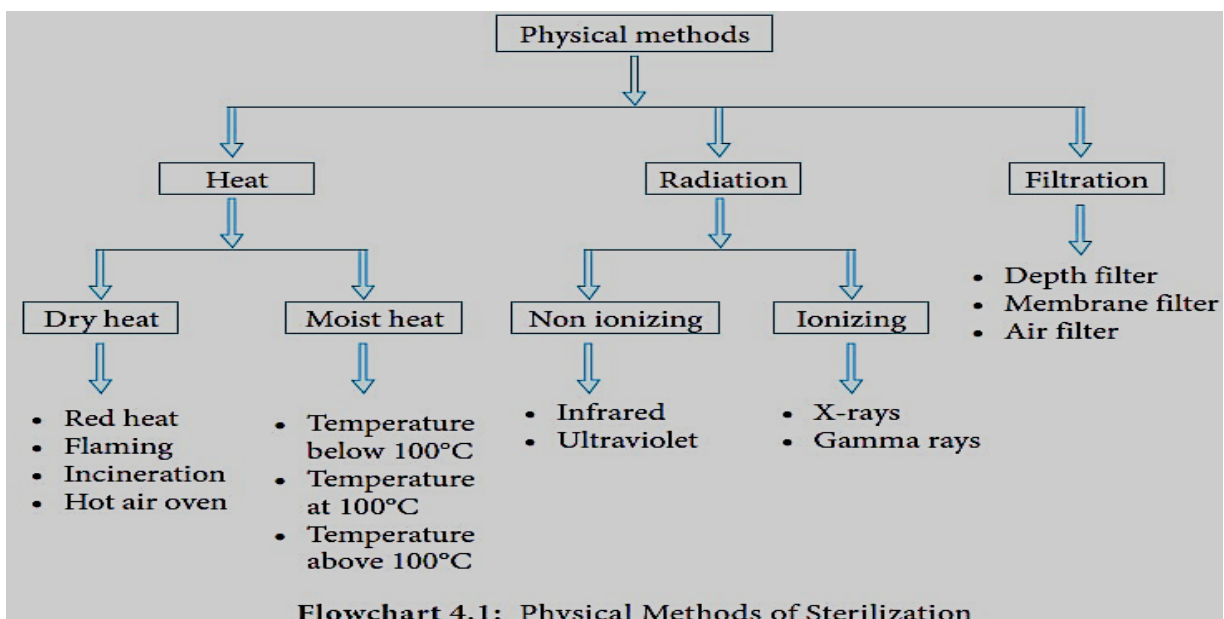
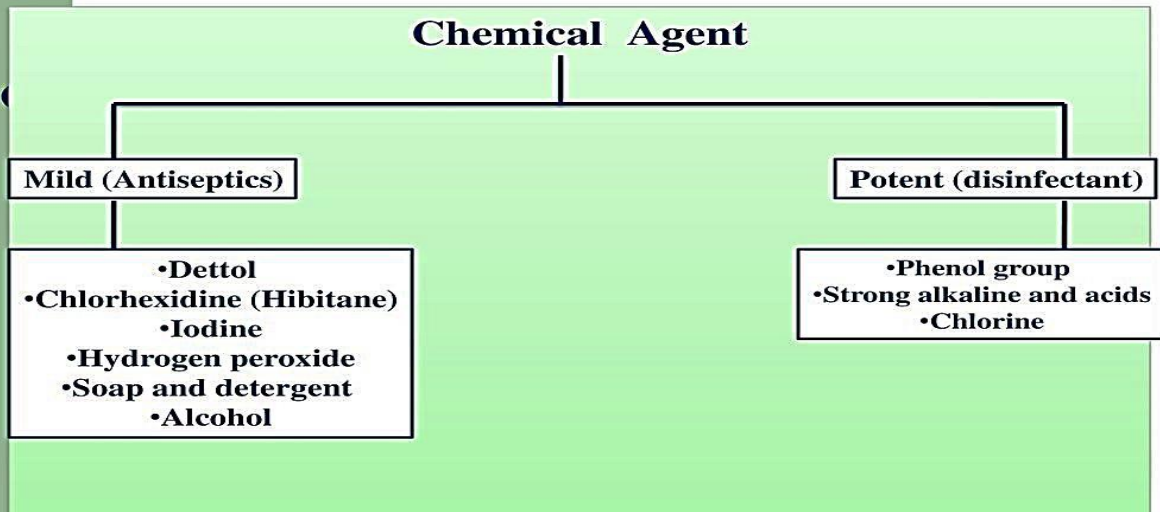


Types Of Sterilization Methods

Classification of Sterilization:



Types of Chemical Methods Sterilization:-



Flowchart 4.1: Physical Methods of Sterilization

Dry Heat Sterilization

HEAT STERILIZATION : DRY HEAT

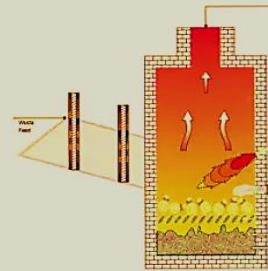


RED HEAT



FLAMING

Incineration:



- Materials are reduced to ashes by burning.
- Instrument used was incinerator.
- Soiled dressings
- Animal carcasses
- Bedding
- Pathological material

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Red Heat

sterilized by holding them in Bunsen flame till they become red hot.

USE :

- ❖ bacteriological loops
- ❖ straight wires
- ❖ tips of forceps and searing spatulas

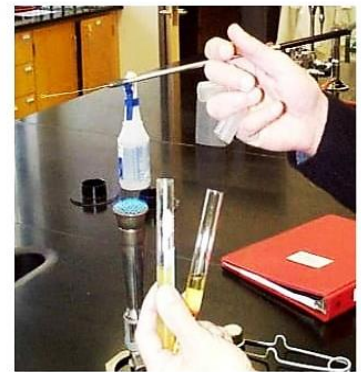


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• Dry heat:

2. **Flaming:** Materials are passed through the flame of a bunsen burner without allowing them to become red hot.

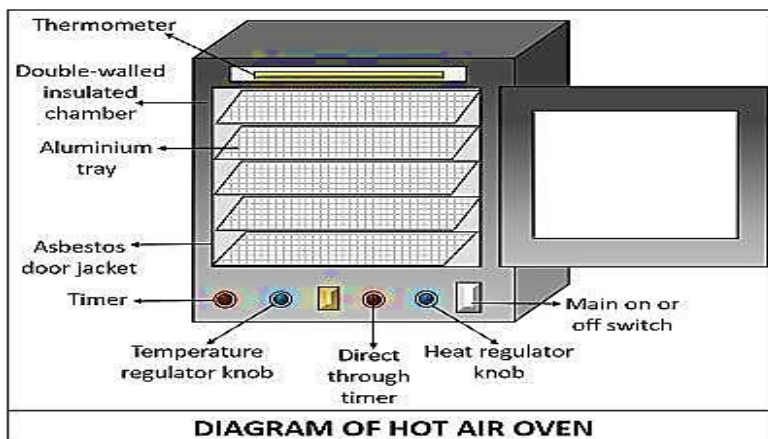
- » Glass slides
- » scalpels
- » Mouths of culture tubes



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Hot Air Oven

Physical sterilization method in which heat-resistant medical devices are exposed to dry heat. Hot air ovens use extremely high temperatures over several hours to destroy microorganisms and bacterial spores. The ovens use conduction to sterilize items by heating the outside surfaces of the item, which then absorbs the heat and moves it towards the center of the item. To ensure the killing of all microorganisms (bacteria, fungi, viruses, and spores) the temperature has to be at least 180 °C for a time period of at least 30 minutes. Items that are sterilized in a hot air oven include: glassware (like petri dishes, flasks, pipettes, and test tubes), powders (like starch, zinc oxide, and sulfadiazine), materials that contain oils, metal equipment (like scalpels, scissors, and blades)

Moist Heat Sterilization

One of the most common is applying moist heat which includes autoclaving (pressure cooking), boiling, and Tyndallization.

Moist heat destroys microorganisms by the irreversible denaturation of enzymes and structural proteins. Also, Pressure serves as a means to obtain the high temperatures necessary to quickly kill microorganisms. Specific temperatures must be obtained to ensure the microbicidal (**an agent that destroys microbes**) activity.

1. Temperature below and at 100°C :

METHODS OF STERILIZATION	BOILING
Moist heat: Pasteurization - It aims to reduce the number of viable pathogens in liquids so they are unlikely to cause disease - It uses heat at temperatures sufficient to inactivate harmful organism in milk. Does not achieve sterilization. - Temperature may be 138°C for a fraction of a second (flash method), 71.7°C for 15-20 seconds 62°C for 30 minutes.	- Boiling of items in water for 15 minutes may kill most of the vegetative forms but not the spores, hence not suitable for sterilization of surgical instruments. - Though boiling is a simple , easy process but not much effective ; hence should not be used if better methods are feasible. 
 Water bath	<i>Water bath delivers sterilized items that need to be either air-dried or manually dried</i>

2. Tyndallization

A presentation of steam at 100°C for 20 minutes on three progressive days is called tyndallization or irregular sanitization. This is a fractional strategy for sterilization.

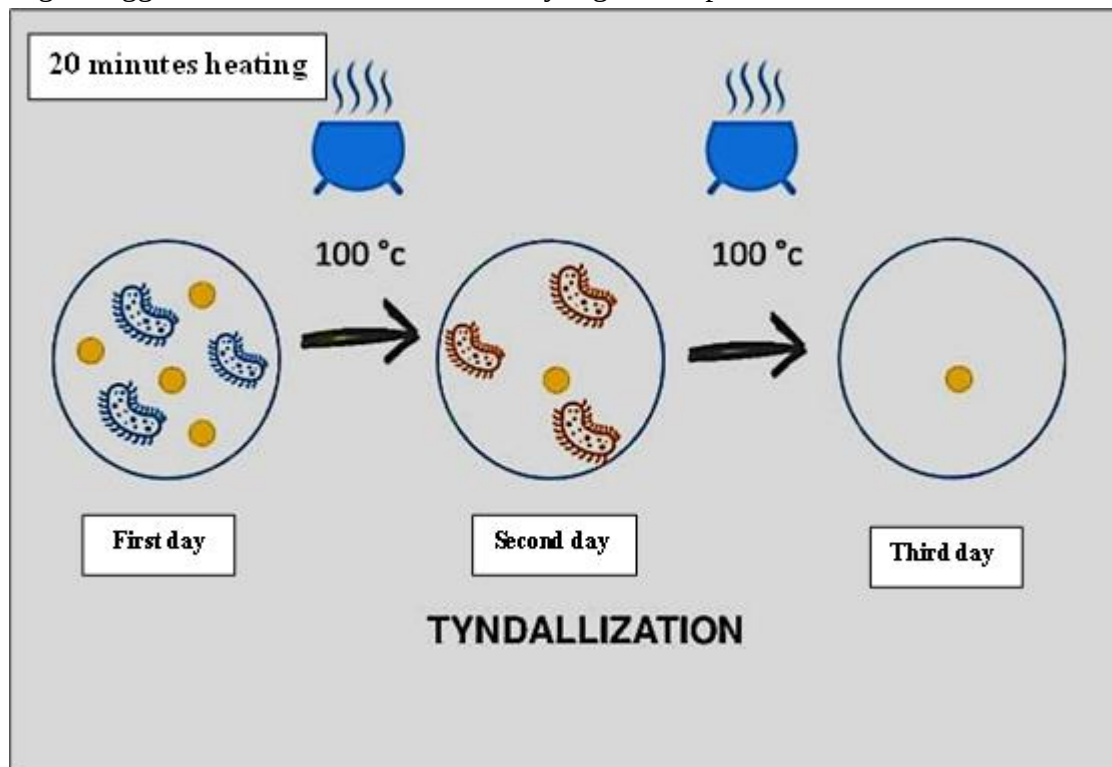
Tyndallization, likewise called fractional sterilization and discontinuous heating, is a type of sanitization. The term sanitization implies the expulsion of every single living microorganism, including spores. The employments of sterilization methods extend from medical instruments to foods. Practically speaking, tyndallization was utilized generally for food stockpiling.

a. Principle

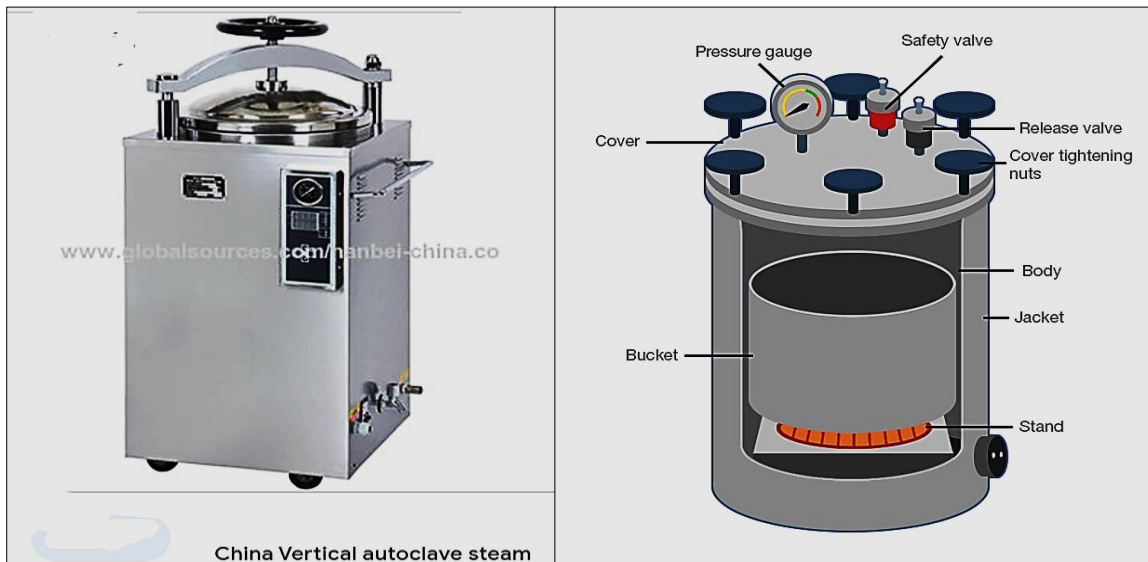
Vegetative cells and a few spores are killed during the first warming and that the more safe spores subsequently develop and are killed amid either the second or the third warming. In spite of the fact that for the most part sufficient, this technique may fall flat with spores of specific anaerobes furthermore, thermophiles.

b. Uses

This technique is helpful in sanitizing heat-sensitive culture media containing such materials as sugars, egg or serum. which are harmed by higher temperature of autoclave.



3. Principle of Autoclave (Temperature above 100°C)



Autoclaving is used to sterilize plastic and glass bottles, plastic caps, medical instruments, applicators, and numerous other items that can withstand high temperatures and pressures. Products or components used in the pharmaceutical or medical field require control of microbial levels during processing and handling.